

**A REVISION OF THE ANTILLEAN SPECIES OF
TRICHOSTELEUM (MUSCI: SEMATOPHYLLACEAE)**

William R. Buck

Buck, William R. (The New York Botanical Garden, Bronx, NY 10458, U. S. A.). A revision of the Antillean species of *Trichosteleum* (Musci: Sematophyllaceae). *Moscosoa* 2(1), 54-60, 1983-- *Trichosteleum* is represented in the West Indies by six species, *T. sentosum*, *T. vincentinum*, *T. brachydictyon*, *T. microstegium*, *T. glaucinum* and *T. subdemissum*. A key to the species and a description of each are provided. *Trichosteleum pluripunctatum* is transferred to *Taxithelium*.

Una revisión de las especies antillanas del género de *Trichosteleum* (Musci: Sematophyllaceae). El género es representado en las Indias Occidentales por seis especies, *T. sentosum*, *T. vincentinum*, *T. brachydictyon*, *T. microstegium*, *T. glaucinum*, y *T. subdemissum*. Una clave para distinguir las especies y una descripción de cada una son presentadas. *Trichosteleum pluripunctatum* se transfiere al género *Taxithelium*.

Trichosteleum is often considered a difficult genus in the West Indies because of the numerous names which have been used, and described, from the area. An examination of type materials as well as numerous other specimens has clarified the problems, and for the first time a key is provided for the groups. Illustrations will be forthcoming in the projected Moss Flora of the West Indies.

Trichosteleum Mitten

Trichosteleum Mitt., J. Linn. Soc., Bot. 10: 181. 1868.

Sematophyllum sect. *Trichosteleum* (Mitt.) Mitt., J. Linn. Soc., Bot. 12: 476, 492. 1869.

Plants slender to moderately robust in thin, often extensive yellowish or brownish-green mats. Stems creeping, freely but irregularly branched, the branches sometimes obscurely complanate. Leaves erect-spreading or rarely falcate-secund, lanceolate to ovate-lanceolate, acute to acuminate-subulate, concave; margins subentire to serrate, sometimes recurved; costa short and double; upper cells linear, singly papillose over the lumina, usually firm-walled and \pm porose, more conspicuously so toward insertion; alar cells greatly differentiated, oblong to oval, often colored, inflated. Autoicous. Calyptrae cuculate, naked, smooth or roughened above. Setae slender, rather short, usually curved at apex, sometimes roughened above; capsules small, pendent; exothecial cells strongly collenchymatous, often bulging; operculum slenderly long-rostrate, usually longer than the urn; peristome double, exostome teeth on outer surface cross-

striolate below, papillose above, with a median furrow or a zig-zag center line, with prominent lamellae projecting at back; endostome from a high basal membrane, the segments papillose, keeled, usually perforate, cilia usually single.

Trichosteleum is separated from many of the other genera of Sematophyllaceae with collenchymatous exothecial cells and inflated, colored alar cells by the singly papillose leaf cells with the papillae situated over the lumina. Although often defined also by a furrowed exostome, this is not a consistent feature, even for the West Indian species. The type species of the genus, *T. fissum* Mitt. from Samoa, has a zig-zag center line. *Trichosteleum* may be polyphyletic as it is essentially a one character genus. Indeed, in some species, such as *T. microstegium*, the papillae are often inconspicuous and not over every cell. This is in contrast to species such as *T. sentosum* in which the papillae are visible even with a dissecting microscope.

Key to the Antillean Species of *Trichosteleum*

- 1. Leaves acute; apical cells much shorter than median ones 6. *T. subdemissum*
- 1. Leaves acuminate; apical cells not differentiated 2
- 2. Leaves serrate; papillae high, to 20 μm tall, as wide as the lumina 1. *T. sentosum*
- 2. Leaves entire to serrulate; papillae low, less than 10 μm tall narrower than the lumina 3
- 3. Median leaf cells thick-walled and strongly porose 3 *T. brachydictyon*
- 3. Median leaf cells firm-walled, not or only slightly porose 4
- 4. Leaf \pm ovate-triangular, short-acuminate, constricted at base to a narrow insertion 5 *T. glaucinum*
- 4. Leaves mostly lanceolate, long-acuminate, insertion not particularly narrow, or if so, gradually tapered 5
- 5. Leaves \pm falcate, subentire 4 *T. microstegium*
- 5. Leaves straight, serrulate 2 *T. vincentinum*

1. *Trichosteleum sentosum* (Sullivant) Jaeger

Trichostelium sentosum (Sull.) Jaeg., Ber. Tätigk. St. Gallischen Naturwiss. Ges 1876-77: 415. 1878.

Hypnum sentosum Sull., Proc. Amer. Acad. Arts 5: 288. 1861.

Sematophyllum sentosum (Sull.) Mitt., J. Linn. Soc., Bot. 12: 493. 1869.

Rhaphidostegium sentosum (Sull.) Besch., Ann. Sci. Nat. Bot., sér. 6, 3: 251. 1876.

Medium sized plants in yellowish, dense, often extensive mats. Stems reddish, creeping, freely but irregularly branched, slightly or not at all complanate-foliate. Leaves 0.85-1.15 mm long, 0.17-0.25 mm wide, erect-spreading, oblong-lanceolate, concave, short- to abruptly long-acuminate, if long-acuminate then usually with the apex flexuose and twisted; margins serrate above, serrulate below, cells linear, \pm thin-walled, papillose in upper 2/3-3/4 leaf length, papillae over almost every cell, large, up to 20 μm tall, as wide as the lumina, often flat-topped; alar cells 2-3 in each basal angle, oblong to oval, usually orange, inflated. Autoicous. Perichaetial leaves 1.0-1.5 mm long, lanceolate, gradually acuminate, serrate, non-papillose. Setae 8-10 mm long, reddish, curved at apex, slightly roughened just below urn; capsules 0.5-0.9 mm long, cylindric to pyriform, usually broadest at mouth; exostome teeth cross-striolate below, papillose above, with a broad median furrow; endostome segments papillose, perforate, keeled, cilia usually 1, rarely 2. Spores 12-14 μm in diameter, almost smooth.

Range. West Indies, southern Central America, northern South America.

West Indian distribution: Cuba, Puerto Rico, Jamaica, Montserrat, Guadeloupe, Martinique.

Trichosteleum sentosum is the easiest species of the genus to recognize in the West Indies, and indeed, it is the most widespread. The very high papillae covering 2/3 of the leaf can be seen with a dissecting microscope. Additionally, the leaf margins are more strongly serrate than any of the other Antillean species of the genus and when the apex is attenuate it is often flexuose and twisted.

2. *Trichosteleum vincentinum* (Mitten) Jaeger

Trichosteleum vincentinum (Mitt.) Jaeg., Ber. Tätigk. St. Gallischen Naturwiss. Ges. 1876-77: 416. 1878.

Sematophyllum vincentinum Mitt., J. Linn. Soc., Bot. 12: 493. 1869.

S. microcarpum Swartz ex Mitt., loc. cit. (Lectotype, chosen here:

Andes Peruviana, Tarapoto, *Spruce 918*, NY), syn. nov.

Leskea microcarpa Swartz ex Mitt., loc. cit., nom. nud. in syn.

Rhaphidostegium vincentinum (Mitt.) Besch., Ann. Sci. Nat. Bot., sér 6, 3: 251. 1876.

R. pterocladium Besch., op. cit. 252, syn. nov.

Trichosteleum pterocladium (Besch.) Jaeg., Ber. Tätigk. St. Gallischen Naturwiss. Ges. 1876-77: 416. 1878.

T. microcarpum (Swartz ex Mitt.) Broth., Nat. Pfl. 1(3): 1119. 1908

Plants golden to golden-green in dense, often extensive mats. Stems creeping, freely but irregularly branched, the branches laxly terete-foliate. Leaves 1.25-1.35 mm long, 0.15-0.21 mm wide, erect-spreading, oblong-lanceolate, \pm concave,

mostly abruptly long-acuminate, the apex often twisted but not flexuose; margins denticulate throughout; cells linear, \pm thin-walled, papillose in upper 3/5 leaf length, papillae over most, but not all cells, obscure to prominent, but less than 10 μm tall, narrower in diameter than the lumen width, usually rounded; alar cells 2(-3) at each basal corner, oblong to oval, usually orange, inflated. Autoicous. Perichaetial leaves 1.25-1.6 mm long, lanceolate, long-acuminate, serrate above, non-papillose. Setae 8-10 mm long, reddish, curved at apex, strongly roughened just below urn; capsule 0.5-0.8 mm long, ovoid-cylindric; operculum conic-rostrate; exostome teeth cross-striolate below, papillose above, with a broad median furrow; endostome segments papillose, perforate, keeled, cilia single. Spores 15-17 μm in diameter finely papillose.

Range: Predominantly Lesser Antillean and northern South America.

West Indian distribution: Dominican Republic, St. Vincent, Dominica, Martinique.

This species is easily confused with, and probably most closely related to *T. sentosum*, but is distinguished by prominent papillae with diameters less than the width of the cell lumina. The leaf apex is usually twisted, but not flexuose. *Trichosteleum vincentinum* also differs from *T. sentosum* in the longer perichaetial leaves and the setae obviously scabrous above.

There is a problem with *Trichosteleum microcarpum*. Mitten first published the name in 1869 but cited Swartz *Leskea microcarpa*, presumably a herbarium name, as the basis for the species. Mitten cited four collections, one by Swartz "Ins. Indiae occidentalis," the other three from South America by Spruce. The Swartz specimen is not in Mitten's herbarium (NY) but, with only minor exception, only *T. sentosum* is found in Jamaica or Hispaniola, where Swartz collected. The three Spruce collections represent two species; two of the collections are treated here as *T. vincentinum* and the other is a species of *Sematophyllum*. Because *T. vincentinum* and *T. microcarpum* were published simultaneously, and *T. sentosum* is an even earlier name, *T. microcarpum* should not alter the nomenclature used here. I have lectotypified *Sematophyllum microcarpum* with a Spruce collection and placed it in synonymy with *T. vincentinum* to insure priority of the latter name.

3. *Trichosteleum brachydictyon* (Bescherelle) Jaeger

Trichosteleum brachydictyon (Besch.) Jaeg., Ber. Tätigk. St. Gallischen Naturwiss. Ges. 1876-77: 416. 1878.

Rhaphidostegium brachydictyon Besch., Ann. Sci. Nat. Bot., sér 6, 3: 252. 1876.

Plants relatively robust and golden in dense, often extensive mats. Stems creeping, freely but irregularly branched, the branches laxly terete-foliate. Leaves 1.4-2.1 mm long, 0.27-0.55 mm wide, erect-spreading, ovate-lanceolate, \pm concave, gradually long-acuminate, the apex usually flat, rarely twisted; margins serrulate-denticulate; cells linear, thick-walled and strongly porose throughout, the lumina about the same width as the walls, papillose in upper 2/3 leaf length, the papillae low, smaller in diameter than the lumen width; alar cells (2-)3 in each basal angle,

oblong, the inner ones orange, the outer one hyaline, inflated. Autoicous. Perichaetial leaves 1.25-1.55 mm long, very similar to vegetative leaves but non-papillose and without conspicuous alar differentiation. Setae ca. 8 mm long reddish, curved at apex, smooth; capsule ca. 0.5 mm long, ovoid; operculum conic-rostrate, longer than the urn; exostome teeth cross-striolate below, papillose above with a narrow median furrow or a zig-zag center line (in the same peristome); endostome segments papillose, keeled, cilia single. Spores 6.25-8.75 μm in diameter, finely papillose.

Range: Endemic to the West Indies.

West Indian distribution: Puerto Rico, Guadeloupe. Reported by Bartram (1955-1956) from Dominica and St. Vincent, respectively.

Trichosteleum brachydictyon is recognized by its lanceolate leaves with very thick-walled and porose cells. The apex gradually acuminate and the small spores are additional useful characters.

This was previously a little-known species thought to be confined to the Lesser Antilles. The Puerto Rican specimen of *T. brachydictyon* was collected on the north slope of the Luquillo Mountains by A. A. Heller in 1900.

4. *Trichosteleum microstegium* (Bescherelle) Jaeger

Trichosteleum microstegium (Besch.) Jaeg., Ber. Tätigk. St. Gallischer Naturwiss. Ges. 1876-77: 416. 1878.

Rhaphidostegium microstegium Schimp. ex Besch., Ann. Sci. Nat. Bot., sér. 6, 3: 253. 1876.

Plants small in green to golden mats. Stems short-creeping, freely but irregularly branched. Leaves (0.68-)0.93 -1.19(-1.31) mm long, 0.14-0.26 mm wide erect-spreading, loosely homomallous when moist, ovate-lanceolate, \pm concave, \pm falcate, gradually long-acuminate, the apex usually flat; margins serrulate or more commonly subentire, often narrowly reflexed, especially in the upper half; cells linear, firm-walled, somewhat porose, papillose in upper 2/3-1/2 leaf length sometimes obscurely so, the papillae low, smaller in diameter than the lumen width, alar cells 2-3 in each basal angle, oval to oblong, hyaline or orange, inflated. Autoicous. Perichaetial leaves 0.7-1.0 mm long, lanceolate, gradually acuminate, serrulate above, non-papillose. Setae 4-6 mm long, orange to reddish, curved at apex, smooth; capsule 0.3-0.4 mm long, ovoid; operculum long rostrate, longer than the urn; exostome teeth cross-striolate below, papillose above, with a very narrow median furrow or zig-zag center line (in the same peristome); endostome segments papillose, keeled, perforate, cilia 1-2, Spores 7.5-9 μm in diameter, finely papillose.

Range: Endemic to the Lesser Antilles.

Rhaphidostegium brachydictyon Besch., Ann. Sci. Nat. Bot., sér. 6, 3:252. 1876.

Although the epithet implies a short operculum, this is not the case. Perhaps Bescherelle (1876) used the Greek *stegos* to mean the object covered by a roof, or in

this case, the urn. Certainly the capsule is very small and Bescherelle did not mention the operculum in his description.

In addition to the small capsule, *T. microstegium* is characterized by subentire, \pm falcate leaves, often with recurved margins. The papillae can be quite conspicuous or difficult to discern.

The species is probably most closely related to *T. brachydictyon* from which it differs by the smaller plants, the more entire and curved leaves and the less incrassate leaf cells. It shares with that species the general leaf shape, \pm thick-walled cells and exostome teeth sometimes with a zig-zag center line and sometimes with a narrow median furrow, as well as small spores.

5. *Trichosteleum glaucinum* (Bescherelle) Jaeger

Trichosteleum glaucinum (Besch.) Jaeg., Ber. Tätigk. St. Gallischen Naturwiss Ges. 1876-77: 416. 1878.

Rhaphidostegium glaucinum Besch., Ann. Sci. Nat. Bot., sér. 6, 3: 253. 1876.

Plants medium-sized in golden-green, dense mats. Stems creeping, freely but irregularly branched, the branches \pm complanate-foliolate. Leaves 0.75-1.6 mm long, 0.18-0.3 mm wide, erect-spreading, ovate-triangular, slightly concave, gradually short-acuminate, the apex usually flat, sometimes twisted, usually abruptly constricted to a narrow insertion; margins serrulate almost to base; cells linear, thin-walled, papillose in upper 4/5 leaf length, the papillae low, smaller in diameter than the lumen width; alar cells differentiated below leaf constriction, 2-3 in each basal angle, oval to oblong, usually orange, inflated. Autoicous. Perichaetial leaves 1.0-1.3 mm long, lanceolate, gradually long-acuminate, serrate above, non-papillose. Setae reddish, more than 7 mm long. The rest unknown.

Range: Endemic to Guadeloupe (known only from the type).

Probably most closely related to *T. vincentinum*, *T. glaucinum* differs in the shorter, relatively broader leaves which are gradually short-acuminate. The leaf base abruptly constricted to a narrow insertion is a unique feature.

6. *Trichosteleum subdemissum* (Bescherelle) Jaeger

Trichosteleum subdemissum (Besch.) Jaeg., Ber. Tätigk. St. Gallischen Naturwiss. Ges. 1876-77: 418. 1878.

Rhaphidostegium subdemissum Schimp. ex Besch., Ann. Sci. Nat. Bot., sér. 6, 3: 250. 1876.

Plants medium-sized in golden-green to yellow brown, lax, often extensive mats. Stems creeping, freely but irregularly branched, the branches usually short, obscurely complanate-foliolate. Leaves 0.75-1.5 long, 0.25-0.4 mm wide, erect-spreading, broadly oblong-lanceolate, very concave, acute; margins subentire to serrulate, occasionally recurved; cells linear, becoming rhombic at apex, thin-walled, papillose in upper 2/3 leaf length, papillae over most cells, low, narrower in diameter than the lumen width; alar cells 2-3 at each basal angle, oblong, lightly

colored, inflated. Autoicous. Perichaetial leaves 0.65-0.82 mm long, lanceolate, acuminate, serrate, non-papillose. Setae ca. 8 mm long, reddish, curved at apex, smooth; capsule 0.7-0.9 mm long, ovoid-cylindric; operculum conic-rostrate, longer than the urn; exostome teeth cross-striolate below, papillose above, with a zig-zag center line; endostome segments papillose, keeled, perforate, cilia single. Spores 12.5-15 μm in diameter, papillose.

Range: Endemic to the West Indies.

West Indian distribution: Cuba, St. Vincent, Guadeloupe.

Trichosteleum subdemissum is easily recognized by its acute leaves with apical cells much shorter than the median ones. The leaves are also more concave than in the other Antillean species of the genus. *Trichosteleum subdemissum* has most often been confused with *T. ambiguum* (Schwaegr.) Par. of northern South America, but that species has longer, more ovate, longer-acuminate leaves with thicker-walled cells. It is related, however, as evidenced by its smooth seta and non-furrowed exostome teeth.

Excluded Species

Trichosteleum pluripunctatum Renaud & Cardot

As the epithet indicates, this species is misplaced in *Trichosteleum* and the following transfer is necessary:

Taxithelium pluripunctatum (Ren. & Card.) Buck, **comb. nov.**

Trichosteleum pluripunctatum Ren. & Card., Bull. Soc. Roy. Bot. Belgique 29(1): 184. 1890.

Taxithelium theliidiellum Besch., J. Bot. (Morot) 16: 10, 1902, syn. nov.

T. patulifolium Thér. in Thér., Dix. & Buch, Ann. Bryol. 7: 160. 1934, syn. nov.

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Literatura Citada

- Bartram, E. B. 1955. Mosses of Dominica, British West Indies. Bull. Brit. Mus. (Nat. Hist.), Bot. 2: 37-49.
- Bartram, E. B. 1956. Mosses of St. Vincent, British West Indies. Rev. Bryol. Lichénol. 25: 116-119.
- Bescherelle, E. 1876. Florule bryologique des Antilles françaises. Ann. Sci. Nat. Bot., sér. 6, 175-265.
- Mitten, W. 1869. Musci austro-americi. J. Linn. Soc., Bot. 12: 1-659.